United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

Part 612 Water Quality
National Resource Economics Handbook

Chapter 2 Economic Concepts

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Contents:

Figures

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612.0200 Introduction

This chapter provides an overview of the economic concepts used in water quality analysis.

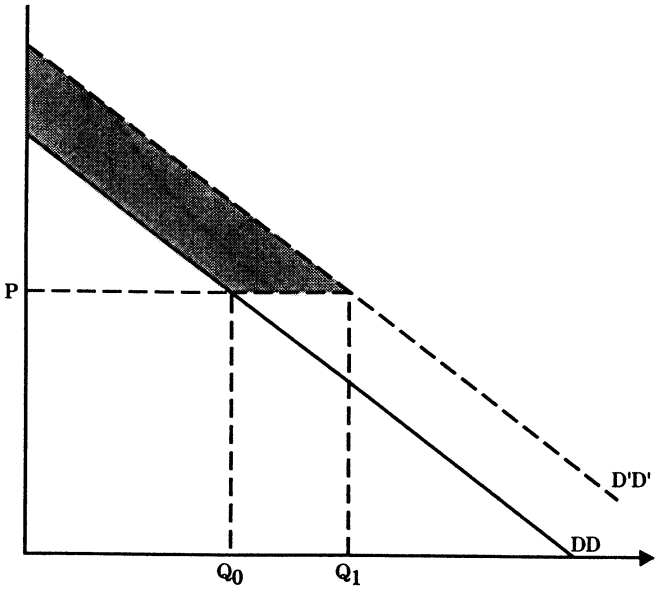
612.0201 Benefit measures: consumer and producer surplus

(a) Consumer surplus and water quality

Consumer surplus can be estimated when demand is known. To estimate consumer demand for a good that is not traded in a market, such techniques as the Travel Cost Method or Contingent Valuation Method need to be used to infer demand and calculate values to estimate consumer surplus. See part 612.0403(c) of this handbook for information on non-market valuation techniques.

Figure 2–1 (curve DD) shows an individual's demand curve for number of days swimming at a beach. A water quality improvement could shift the demand curve to the right. The increase in consumer surplus is shown by the shaded area.

Figure 2–1 Consumer surplus



A water quality improvement shifts the demand for days swimming at the beach to the right. The increase in consumer surplus is shown by the shaded area. In this example, the consumer's opportunity cost of a beach day is a constant, P.

The gross benefits to consumers from an improvement in water quality is the sum of consumer willingness to pay for the improvement. Consumer surplus is the amount by which the consumers' willingness-to-pay exceeds what they must pay (taxes, user fees) to get the improvement.

(b) Producer surplus and water quality

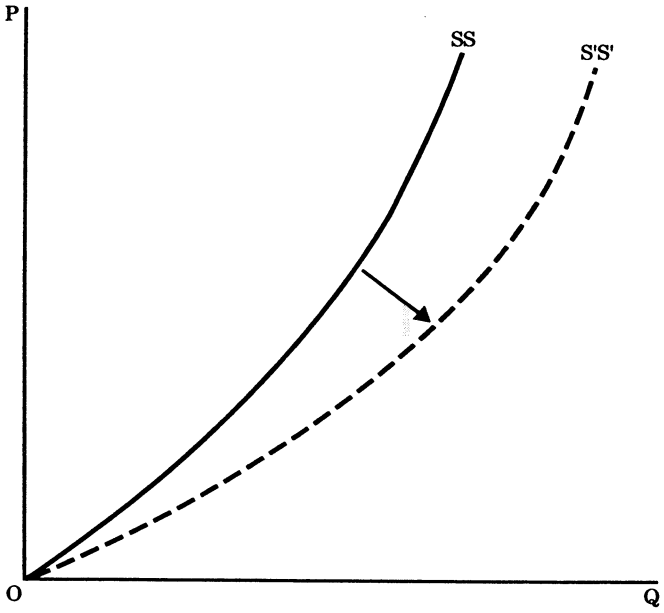
Producer surplus is the difference between the cost of production and the sale price. The supply curve SS in figure 2–2 represents the marginal cost of producing each successive unit of a good.

Sometimes, improvements to water quality may reduce producer costs. For example, costs to treat cleaner water for use in manufacturing processes could be less than the cost before a water quality improvement. A decrease in producer costs from a water quality improvement is illustrated by Curve S'S' in figure 2–2. Example 5–2 in Chapter 5, Benefit Categories, illustrates input cost-savings from improved water quality.

The shaded area in figure 2–3 shows the increase in producer surplus from lower input costs. In this case a producer is better off after nonpoint source pollution controls have been implemented.

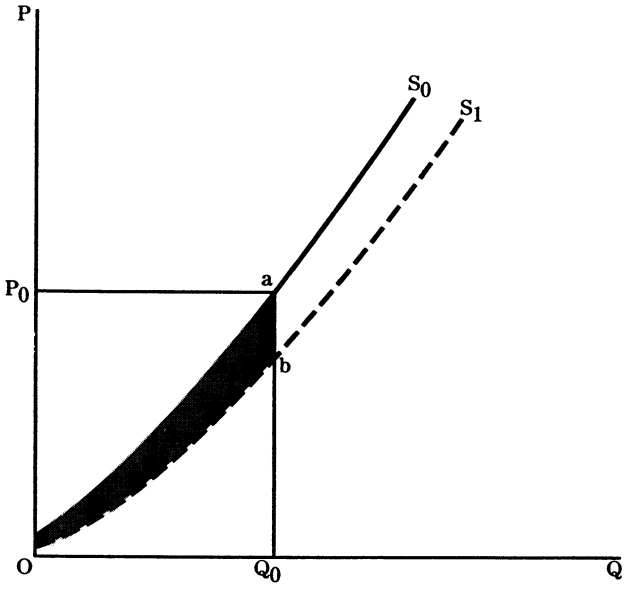
Water quality improvement effects on producer income should be added to the consumer surplus to find the total net benefits.

Figure 2–2 Reduction in input costs



Improvements in water quality may reduce costs of production. When input costs fall, the supply curve shifts downward. For example, the cost of producing 100 pounds of beef is lower when the cattle are not stressed by a poor quality water supply.

Figure 2–3 Change in producer surplus



If production costs fall and the producer continues to sell Q_0 units at P_0, producer surplus increases by area Oab. In this example, production quantity is fixed in the short run and the producer is a price taker.